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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the printer which prints by the ink head carried in the carriage carrying out reciprocation moving in the direction which intersects perpendicularly to a sheet conveying direction like an ink-jet printer repeatedly, and relates to the end of the cross direction of a paper especially at the printer in which edge-less printing is possible, and an edge-less printing method.

[0002]

[Description of the Prior Art]Although the printer which prints by the carriage provided with the ink head like an ink-jet printer carrying out reciprocation moving to direction crossing at a right angle (cross direction of a paper) from before repeatedly to the transportation direction of a paper is used widely, In recent years, in order to add the value further, the printer in which edge-less printing is possible is proposed by printing to the end of a paper.

[0003]For example, the overprint beyond the boundary line of the paper is performed to JP,2000-118058,A, and the printer provided with the ink absorber for absorbing the regurgitation of the ink by this overprint is indicated. According to this printer, it is supposed that edge-less printing from one end of a paper to the other can be performed, without polluting the back side of a paper with ink.

[0004]The apparatus for thermal transfer recording which records in the direction which intersects the transportation direction both sides of a record sheet in a record sheet transportation direction to the field beyond this perforated line to the record sheet which provided the perforated line which can be cut off is indicated by JP,2000-326531,A. In this case, it enables it to provide a whole-surface-edge-less recorded image by cutting off the end of a record sheet along the above-mentioned perforated line after the end of record.

[0005]The recorder which equipped JP,2000-351521,A with the cutoff means for forming a

perforated line to a recording medium is indicated. According to this recorder, a whole-surface-edge-less picture can be easily acquired after the end of record like the above by cutting off the end of a recording medium along the perforated line formed in the recording medium.

[0006]

[Problem(s) to be Solved by the Invention]However, in the above conventional printers, it has the following problems. That is, in order to overprint on JP,2000-118058,A with the printer of a statement exceeding the boundary line of a paper, it is necessary to form an ink absorber and, and when the ink absorption by an ink absorber is not enough, the rear face of a paper will be polluted with ink. There is a problem that an ink consumption amount increases by supply of the ink to the ink absorber portion outside a print area in order to consume ink vainly.

[0007]The apparatus for thermal transfer recording of JP,2000-326531,A and the recorder of JP,2000-351521,A, The portion which both needed to cut off the end of the recording medium along the perforated line formed in the recording medium, and the user cut off must be discarded, therefore excessive time and effort is taken, and it is trouble.

[0008]Since it is necessary to form the cutoff means for forming the above-mentioned perforated line, part mark increase, a device is complicated, and it becomes a cause of a cost hike, and miniaturization of a device also becomes difficult.

[0009]do this invention in view of such the actual condition -- the composition which can perform high-definition edge-less printing without requiring an ink absorber -- it aims at providing a simple printer and an edge-less printing method.

[0010]

[Means for Solving the Problem]This invention constitutes above-mentioned The means for solving a technical problem as follows.

[0011](1) In a printer with which a carriage provided with an ink head prints by carrying out reciprocation moving to direction crossing at a right angle to a sheet conveying direction, A sensor formed in said carriage in order to detect an end of the cross direction of a paper, and a control means which outputs a control command for performing edge-less printing based on paper position information from said sensor were provided.

[0012]In this composition, edge-less printing printed until it performs a detecting position of a paper and results in an end of a paper based on that detection result by a sensor is attained. That is, a carriage provided with a sensor is made to stand by to a paper conveyed in a record feasible region on a line by which an end of the cross direction of a paper is conveyed irrespective of size of a paper, and a carriage performs the first printing scan at the same time it detects an end of a paper. And if a sensor detects the other end of the cross direction of a paper, the first printing scan is ended at the time, and a carriage will return to one end of a paper and will perform the second printing scan.

[0013]Thus, a sensor detects an end of the cross direction of a paper and edge-less printing

printed by a control command outputted from a control means according to a control program set up beforehand until it results in an end of a paper regardless of a paper size is performed based on the position detection information.

[0014]In the printing scan, since regurgitation of ink is terminated at the end of a paper by a control means based on paper position information from a sensor, an ink absorption means in a case of overprinting like a conventional example is not needed, but high-definition edge-less printing is attained, without polluting a rear face of a paper.

[0015]Since it is not necessary to cut off an end of a paper, and time and effort for it can be saved and a cutoff means becomes unnecessary, composition of a device can be simplified and reduction of cost and miniaturization are attained.

[0016](2) Said sensor is provided with a light emitting device and a photo detector, and locate the halfway point of said both elements on extension wire in the move direction of said carriage by the side of a start of printing.

[0017]In this composition, since an ink nozzle of an ink head is located on extension wire of a position (position from which an output becomes the maximum) of light which can receive most efficiently light emitted from a light emitting device with a photo detector, detection of an exact paper is attained.

[0018](3) Said control means possesses a memory measure for memorizing said paper position information.

[0019]In this composition, by making a memory measure memorize paper position information acquired in process of the first printing scan, detection of a paper end by a sensor of the second henceforth can become unnecessary, and press speed can be raised.

[0020](4) Said control means makes paper position detecting operation with said sensor same with having detected an end of said paper in process of the first printing scan perform in said sensor several printing scan of every.

[0021]In this composition, for example in a case where a paper is conveyed aslant a little etc., even if a paper position can be amended and there are a position gap of some paper etc. by performing paper position detection by a sensor anew for every several scans, high-definition edge-less printing is attained.

[0022](5) When said control means performs said paper position detection, it controls movement speed of a carriage later than inside of the usual presswork.

[0023]In this composition, it is with a case where paper position detection by a sensor is performed, and a case where a sensor does not perform paper position detection, and precision improvement of paper position detection and improvement in press speed can be aimed at by adjusting movement speed of a carriage appropriately.

[0024](6) A straight line which ties a light emitting device and a photo detector of said sensor was set up in parallel to a sheet conveying direction.

[0025] Since an optical path which detecting light for detecting existence of a paper in this composition by installing a sensor in a sheet conveying direction and parallel as mentioned above reflects in a paper from a light-emitting part, and reaches to a light sensing portion becomes in the same direction to the paper end face, Catoptric light from the paper end face can be reflected with sufficient accuracy to the paper end face, and a position of the paper end face can be detected exactly.

[0026] (7) If a sensor formed in a carriage detects an end of the cross direction of a paper carried in to a record feasible region, Said carriage performs the first printing scan from the end side of said paper, In process of the first printing scan, when said sensor detects the other end of the cross direction of said paper, the first printing scan is ended, said carriage returns to the one end side of said paper, and a printing scan after the second printing scan is performed.

[0027] In this method, a sensor formed in a carriage detects an end of the cross direction of a paper, and based on that position detection information by a control command outputted from a control means according to a control program set up beforehand. Regardless of a paper size, edge-less printing printed even at the end of a paper can be performed.

[0028] In the printing scan, since discharge starting of ink in an end (one end and the other end) of a paper and an end of the regurgitation are controlled with sufficient timing by a control means based on paper position information from a sensor, High-definition edge-less printing is attained without not needing an ink absorption means in a case of overprinting like a conventional example, but polluting a rear face of a paper.

[0029] Since it is not necessary to cut off an end of a paper, and time and effort for it can be saved and a cutoff means becomes unnecessary, composition of a device can be simplified and reduction of cost and miniaturization of a device are attained.

[0030]

[Embodiment of the Invention] It explains in detail, referring to drawings per the printer concerning one gestalt of operation of this invention, and edge-less printing method.

[0031] Drawing 1 and drawing 2 show the composition of the ink-jet printer 10 as a printer. The ink-jet printer 10 is provided with the following like a graphic display.

The printing department 81 which prints on the record paper P.

The feeding part 82 which supplies the record paper P to a print point.

The transportation part 83 which passes the printing department 81 and conveys the record paper P in a printing process.

The discharge part 85 which discharges the printed record paper P.

[0032] The feeding part 82 has the paper feed tray 103, the feed roller 104, and the division plate 105. The paper feed tray 103 accommodates and feeds paper to the record paper P

which should be printed, and the feed roller 104 and the division plate 105 separate at a time one sheet of record paper P accommodated in the paper feed tray 103, and it supplies them to the transportation part 83.

[0033]The transportation part 83 is provided with the guide plate 106 and the transportation roller 107, the guide plate 106 leads the recording form P to which paper has been fed from the feed roller 104 to the printing department 81, and the transportation roller 107 conveys the record paper P which passed through the guide plate 106 top to the ink head 101.

[0034]The printing department 81 is provided with the ink carriage 203, the shaft 202, and the platen 102, and the ink carriage 203, The ink head 101 was moved along with the shaft 202, and as shown in drawing 3, it has the ink head 101 which carries out the regurgitation of the ink of four colors {cyanogen (C) Hierro (Y) magenta (M) black (B)}, and the sensor 20 for end detection of a paper. The sensor 20 is mentioned later.

[0035]The ink head 101 breathes out the ink supplied from the cartridge which is not illustrated, and forms a picture in the record paper P. The shaft 202 is a guide member for guiding the ink carriage 203 so that it may move along a scanning direction. The direction (the paper width direction) to which the transportation direction of the record paper P and a scanning direction cross at right angles is said.

[0036]In the case of printing (ink discharge), the platen 102 serves as a stand (printing base) for laying the record paper P, and performs maintenance of the surface smoothness of the record paper P, and range adjustment of a nozzle and the record paper P.

[0037]The discharge part 85 has the discharge roller 108 and the discharging tray 109. The discharge roller 108 discharges the record paper P printed by the ink head 101 to the discharging tray 109.

[0038]Subsequently, the print operation of the ink-jet printer 10 constituted as mentioned above is explained. First, a user lays the record paper P on the paper feed tray 103 of the ink-jet printer 10. And if the ink-jet printer 10 receives the printing demand from a computer etc., The feed roller 104 and the division plate 105 feed one sheet of record paper P at a time to the transportation part 83, and it is conveyed by the ink head 101 with the transportation roller 107, supporting the record paper P to which paper was fed to the guide plate 106.

[0039]Next, the ink head 101 prints by breathing out ink to the conveyed record paper P. This printing is performed by moving the ink carriage 203 provided with the ink head 101 to a scanning direction along with the shaft 202.

[0040]That is, the ink carriage 203 is arranged in the start position in a scanning direction where while was provided in the end (end of a shaft) in the case of printing. And it moves along a scanning direction to the stop position established in the end of another side according to the printing demand.

[0041]And the ink head 101 carries out the regurgitation of the ink to the record paper P

according to a printing demand in the case of this movement. Thereby, the picture for one scan (it is hereafter indicated as a line image) can be printed by the ink head 101. The width of a line image is equivalent to the dip (width of a sheet conveying direction) of the ink head 101. [0042]After the line image of a 1 scanning eye is printed, the transportation roller 107 makes the record paper P on the platen 102 convey by the width of a line image, between this conveyance, the ink carriage 203 returns to a start position, and the next printing scan is performed succeedingly.

[0043]By repeating such a printing scan and performing it in the ink-jet printer 10. By the ink head 101, the information according to a printing demand is printed on the record paper P, the printed record paper P is discharged by the delivery tray 109 through the paper ejecting roller 108, and a user is provided with it as a document (printed matter).

[0044]By the way, the ink-jet printer 10 of this embodiment has formed the sensor 20 for detecting the end of the cross direction of a paper in the ink carriage 203, in order to perform edge-less printing.

[0045]As shown in drawing 3, this sensor 20 is formed in the ink carriage 203 with the ink head 101, and between the ink head 101 cyanogen (C) Hierro (Y) magenta (M) blacks (B) of four colors, It is arranged at the position which separated the distance d1 and d2, d3, and d4, respectively.

[0046]As shown in drawing 4, the sensor 20 is provided with the light emitting device 21 and the photo detector 22, irradiates with light from the light emitting device 21 to the record paper P, and detects the existence of the record paper P by receiving the catoptric light with the photo detector 22.

[0047]The sensor 20 is arranged so that the center of the light emitting device 21 and the photo detector 22 may be located on the extension wire in the move direction of the ink carriage 203 of the ink head 101.

[0048]Thereby, when the light emitting device 21 emits light to the mid-position (center position) of the light emitting device 21 and the photo detector 22, the photo detector 22 can receive the catoptric light most efficiently.

[0049]Therefore, the detecting position of the exact record paper P can be performed by arranging the ink head 101 of the side which carries out the regurgitation of the ink to the record paper P first on the extension wire of the above-mentioned mid-position. Edge-less printing which prints by printing by making the ink carriage 203 scan simultaneously with the detecting position of the record paper P until it results in the end of the record paper P is attained.

[0050]That is, as shown in drawing 4, when the record paper P is conveyed, the ink carriage 203 moves the ink carriage 203 from the home position of a shaft end, and detects the end of the record paper P by the sensor 20. Detection of the record paper P will start printing from the

end of the record paper P in consideration of the time lag computed from distance dl-d4 of the nozzle of the ink head 101 of four colors, and the center position of the light emitting device 21 and the photo detector 22 in which light is emitted from the light emitting device 21 to the record paper P.

[0051]And in the 1 scanning eye of the ink carriage 203. The sensor 20 is making the memory measure 31 (refer to drawing 6) memorize the position of the ink carriage 203 which detected the other end of the record paper P and the position which stopped detecting the record paper P, i.e., from one end of the cross direction of the record paper P to the other end, as shown in drawing 5. Thereby, the control means 30 can perform edge-less printing from one end in the cross direction of the record paper P to the other end, without performing the detecting position of the record paper P after a 2 scanning eye.

[0052]By what is made to memorize the detection position of the record paper P as mentioned above although it may print detecting the record paper P by the sensor 20 with same 2 scanning eye or subsequent ones like a 1 scanning eye. Since the movement speed of the ink carriage 203 can be gathered at the time of the scan which does not perform detection by the sensor 20, print speed can be raised notably.

[0053]In order to make the result of the detecting position of the record paper P by such a sensor 20 memorize, it is preferred to establish the control means 30 independently [the ink carriage 203] in the ink-jet printer 10 for example, as shown in drawing 6.

[0054]The detecting signal which was provided with the memory measure (RAM) 31 which memorizes the position information on the ink carriage 203, and the control section (CPU) 32, and was detected by the sensor 20 is inputted into the memory measure 31, and the control means 30 is sent to the control section 32 as position data.

[0055]The control section 32 sends an ink head driving signal to the ink head driving means 34, and controls the discharging timing of ink while it sends out a signal from the above-mentioned position data to the ink carriage driving means 33 and drives the ink carriage 203.

[0056]Subsequently, the flow chart of drawing 7 explains edge-less printing (complete printing) by such a control means 30. If a print command is inputted into the ink-jet printer 10, it will be detected whether the ink-jet printer 10 is a 1 scanning eye (S1).

[0057]When it is a 1 scanning eye at this time, (S4) and printing are started, after making movement speed of the ink carriage 203 late (S2), making the sensor 20 detect the end (end) of the record paper P (S3) and making the memory measure 31 memorize that detection position (S5).

[0058]Next, the position (other end) from which the record paper P is no longer detected by the sensor 20 is detected (S6), and the memory measure 31 is made to memorize the position of the ink carriage 203 in the time (S7), the first printing scan is ended (S8), and it is detected whether the scan is the last scan (S9).

[0059]On the other hand, in not being a 1 scanning eye in the judgment by S1, Make movement speed of the ink carriage 203 quick (S10), and the ink carriage 203 is moved to the print starting position memorized by the memory measure 31 (S11), Printing is started (S12), it prints to the print ending position similarly memorized by the memory measure 31 (S13), printing of 1 scan is ended (S14), and it is detected whether this scan is the last scan (S9). And it ends a printing scan, in being the last scan, and when it is not the last scan, again, a scan is repeated, it prints to the last scan, and complete printing is attained.

[0060]As mentioned above, in this ink-jet printer 10, the memory measure 31 is made to memorize one end (one end) of the cross direction of the record paper P, and the end (other end) of another side, and it becomes possible to perform complete printing (edge-less printing).

[0061]By thus, the control command outputted from the control means 30 according to the control program with which the sensor 20 detected the end of the cross direction of the record paper P, and was beforehand set up based on the position detection information. Regardless of a paper size, edge-less printing printed until it results in the end of a paper can be performed.

[0062]In the printing scan, since the discharge starting of ink and the end of the regurgitation are controlled with sufficient timing by the control means 30 at the end (one end and the other end) of a paper based on the paper position information from the sensor 20, High-definition edge-less printing is attained without not needing the ink absorption means in the case of overprinting like a conventional example, but polluting the rear face of a paper.

[0063]Since it is not necessary to cut off the end of a paper, and the time and effort for it can be saved and a cutoff means becomes unnecessary, the composition of a device can be simplified and the reduction of cost and miniaturization of a device are attained.

[0064]By the way, it is more preferred for the record paper P to incline a little, to be conveyed by a certain cause, and to perform the detecting position of the record paper P by the sensor 20 again for every several scans in consideration of such a case. Inclination of the record paper P in a printing process can be detected by this, and still more nearly high-definition complete printing can be ensured.

[0065]In the ink-jet printer 10 of this embodiment. As shown in drawing 3 and drawing 4, the sensor 20 explained the example located on the extension wire of the scanning direction of the ink carriage 203, i.e., the cross direction of the record paper P, (direction crossing at a right angle to a transportation direction) to the ink head 101, but this invention is not limited to this.

[0066]For example, as shown in drawing 8, the sensor 20 may be located on the extension wire of the transportation direction of the record paper P of the ink head 101.

[0067]In the ink-jet printer 10 of drawing 8, If the record paper P is conveyed and the record paper P is detected by the sensor 20, in consideration of the time lag by the distance d2 of the

center position of the sensor 20, and the end of the ink head 101, the record paper P will once retreat and will be printed by the ink head 101. Thus, even if it is arrangement of the sensor 20 as shown in drawing 8, complete printing is attained by controlling conveyance of the record paper P appropriately.

[0068]

[Effect of the Invention]By the above explanation, this invention does the following effects so so that clearly.

[0069]Since according to claim 1 the sensor formed in the carriage and the control means for performing edge-less printing based on the paper position information from said sensor are provided in order to detect the end of the cross direction of a paper, A sensor performs the detecting position of a paper and edge-less printing printed by a control means until it results in the end of a paper is attained based on the detection result.

[0070]In the printing scan, since the discharge starting of the ink in the end (one end and the other end) of a paper and the end of the regurgitation are controlled with sufficient timing by a control means based on the paper position information from a sensor, The ink absorption means in the case of overprinting like a conventional example is not needed, but high-definition edge-less printing is attained, without polluting the rear face of a paper.

[0071]Since it is not necessary to cut off the end of a paper, and the time and effort for it can be saved and a cutoff means becomes unnecessary, the composition of a device can be simplified and the reduction of cost and miniaturization are attained.

[0072]Since according to claim 2 a sensor is provided with a light emitting device and a photo detector and locates the halfway point of both the element on the extension wire in the move direction of the carriage by the side of a start of printing, Since the ink nozzle of an ink head is located on the extension wire of the position (position from which an output becomes the maximum) of the light which can receive most efficiently the light emitted from a light emitting device with a photo detector, detection of an exact paper is attained.

[0073]Since the control means possesses the memory measure for memorizing paper position information according to claim 3, By making a memory measure memorize the paper position information acquired in process of the first printing scan, detection of the paper end by the sensor of the second henceforth can become unnecessary, and press speed can be raised.

[0074]Since paper position detecting operation with control means same with having detected the end of said paper in process of the first printing scan of a sensor is made to perform in said sensor several the printing scan of every according to claim 4, For example, in the case where the paper is conveyed aslant a little etc., even if a paper position can be amended and there are a position gap of some paper etc. by performing paper position detection by a sensor anew for every several scans, high-definition edge-less printing is attained.

[0075]Since according to claim 5 a control means controls the movement speed of a carriage

later than the inside of the usual presswork when performing paper position detection, precision improvement of paper position detection and improvement in press speed can be aimed at by adjusting the movement speed of a carriage appropriately.

[0076] Since the straight line which ties the light emitting device and photo detector of a sensor is set up in parallel to a sheet conveying direction according to claim 6, Since the optical path which the detecting light for detecting the existence of a paper reflects in a paper from a light-emitting part, and reaches to a light sensing portion becomes in the same direction to the paper end face, the catoptric light from the paper end face can be reflected with sufficient accuracy to the paper end face, and the position of the paper end face can be detected exactly.

[0077] According to claim 7, the sensor formed in the carriage detects the end of the cross direction of a paper, and based on the position detection information by the control command outputted from a control means (following the control program set up beforehand). Regardless of a paper size, edge-less printing printed even at the end of a paper can be performed.

[0078] In the printing scan, since the discharge starting of ink and the end of the regurgitation are controlled with sufficient timing by a control means at the end (one end and the other end) of a paper based on the paper position information from a sensor, The ink absorption means in the case of overprinting like a conventional example is not needed, but high-definition edge-less printing is attained, without polluting the rear face of a paper.

[0079] Since it is not necessary to cut off the end of a paper, and the time and effort for it can be saved and a cutoff means becomes unnecessary, the composition of a device can be simplified and the reduction of cost and miniaturization of a device are attained.

[Translation done.]